

waveguide, an output slab waveguide including an input side and an output side, said input side of said output slab waveguide being connected to said output side of said arrayed waveguides,

a plurality of output waveguides connected to said output side of said output slab waveguides;

a wedge-shaped groove formed in said arrayed waveguides; and

a material filled in said groove, said material having a negative refractive index temperature coefficient;

wherein said material disposed in said groove confines light incident to said groove in a vertical and a horizontal direction thereby preventing the light from spreading in said groove.

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